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EXAMINER

TRAN, NHAN T

ART UNIT PAPER NUMBER

2615

DATE MAILED: 04/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/903,300

Applicant(s)

HARPER ET AL.

Examiner

Nhan T. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/3/2004 & 4/4/2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 and 49-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-47 and 49-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/4/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-47, 49-53 have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al (US 5,702,059) in view of Lewis (US 6,836,288).

Regarding claim 1, Chu discloses an imaging device for capturing optical image data (Figs. 1 & 2) comprising:

an imager (40) for generating an image signal (Fig. 2);

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a memory component (19 and/or inherent buffer in circuitry 18) that receives the image signal from the imager and stores the image signal as image data (Figs. 1 & 2; col. 8, lines 43-45);

a processor (whole circuitry 14 comprising microprocessor 16) executes an exposure control routine (Fig. 5) by implementing a first module (fuzzy logic control 20) that controls the exposure and gain setting in the imager (Fig. 2; col. 9, lines 9-20) and a second module (signal processing circuitry 26) that implements computations in response to exposure data (exposure index values 70, 72 and 66, 68) transmitted from the first module to determine a targeted exposure and gain setting. See col. 9, line 20 – col. 10, line 9.

Chu does not specifically disclose that the first module and the second module are software-exclusive modules. However, Chu suggests that the first and second modules are not only implemented as circuitry 18, but those modules may also be embodied in software resident in one or more RAM or ROM memory chips mounted on the board 14 and operated under microprocessor 16 (see Chu, col. 7, lines 20-30). In other reference to Lewis, a memory (14a) stores a plurality of software-exclusive modules that are executed by a microprocessor (14) for controlling exposure and gain settings of an imager (Figs. 9a or 9b and col. 19, line 65 – col. 20, line 9). Lewis teaches that one software-exclusive module (Figs. 10(a) – 10(c)) is executed to control the exposure (e.g., SendShutter) and gain setting (e.g., SendGain) of the imager and another software-exclusive module (Figs. 11(a) – 11(k)) is executed to implement computations in response to exposure data (e.g., GetLumaAverage) transmitted from the first module to determine a targeted exposure and gain setting for a next frame (see col. 20, lines 9-46). The teaching of Lewis is to rapidly and smoothly adjust the desired exposure (electronic shutter and

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gain settings) of an imaging device by using either hardware circuitry or equivalent software-exclusive modules. See col. 6, lines 28-37.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the imaging device in Chu by implementing the first and second modules using software-exclusive modules to reduce size and manufacturing cost of the imaging device while maintaining equivalent performance compared to hardware circuitry.

Regarding claim 2, Chu discloses that the imager generates the image signal from multi-dimensional symbologies (see col. 1, lines 16-25 for 2D bar codes and matrix codes).

Regarding claim 4, both Chu and Lewis disclose that the processor executes at least one application program of the imaging device. See Chu, Fig. 5, col. 7, lines 19-30 and Lewis, Figs. 10(a) - 12. Note the Examiner's analysis in claim 1.

Regarding claim 5, inherent in the combination of Chu and Lewis is that the processor executes an operating system of the imaging device in order for the system to function as disclosed.

Regarding claim 6, see the analyses of claims 4 & 5.

3. Claims 3, 7-13, 18-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al and Lewis as applied to claim 1 and in further view of Danielson et al (US 5,227, 614).

Regarding claim 3, Chu and Lewis clearly teach that the imaging device can be implemented with software-exclusive modules resident in one or more memory chips under control of the microprocessor for controlling exposure and gain settings as well as analyzing image data to compute targeted exposure and gain settings in subsequent frames. However, Chu and Lewis do not specifically teach that the processor is provided with multi-tasking capabilities.

Danielson teaches a hand-held device such as a bar code reader which is built with a processor that is provided with a multi-tasking operating system to run various software routines at a fixed priority level and *a wide range of application software* concurrently without jeopardizing the reliability of the system under extended portable operating conditions (see col. 2, lines 3-19).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the imaging device of Chu and Lewis with the teaching of Danielson to provide the processor with a multi-tasking operating system in which the first software-exclusive module and second software-exclusive module would be operated at certain priority levels while other applications would be also run concurrently so that an efficient processing is realized without jeopardizing the reliability of the system under extended operating conditions.

Regarding claims 7, 8, 10 & 11, the combination of Chu, Lewis and Danielson would result the imaging device having all limitations of these claims. Since the processor is built with *multitasking capabilities* as analyzed in claim 3 above, the first software-exclusive module is

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always executed in real time to immediately send shutter and gain settings to the imager for capturing an image whenever the imaging device is commanded to capture images (note real time execution in Chu at steps 202-206 of Fig. 5 and Lewis, col. 20, lines 1-26) and right after that the second software-exclusive module is executed to compute shutter and gain settings for a next frame by analyzing image data captured from the previous frame (see Lewis, col. 20, lines 27-46). It is clearly seen from the combination of Chu, Lewis and Danielson that the first software-exclusive module is implemented in a *high priority task or thread routine* in order for the imaging device to response to a capturing command in real time while the second software-exclusive module is implemented in a *lower priority task or thread routine* for analyzing/computing the image data in a subsequent period of time and sending a feedback to the first software-exclusive module to apply targeted shutter and gain settings for a next frame.

Regarding claim 9, see the analyses of claims 7 & 8 and note that high priority task or thread routine is also an interrupt service routine.

Regarding claim 12, as shown in **Fig. 2** in Chu and in view of Lewis and Danielson, the second module comprises a histogram processing.

Regarding claim 13, see the analyses of claims 9 & 11.

Regarding claim 18, see the analyses of claims 1, 7, 8, 10 and 11.

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Regarding claim 19, see the analyses of claims 1, 7, 8, 10 and 11, wherein an end of frame signal must be generated in order for the imaging device to function as disclosed.

Furthermore, the exposure and gain settings clearly define a captured contrast setting (i.e., gray scale values; see Chu, col. 9, lines 20-64 and/or Lewis, col. 5, lines 2-5).

Regarding claims 20-22, see the analyses of claims 4-6, respectively.

Regarding claims 23-28, see the analyses of claims 7-12, respectively. Note that the analysis of claim 19 is also applied to these claims.

Regarding claim 29, see the analyses of claims 1, 18 & 19.

Regarding claim 30, see the analyses of claims 9 & 25.

Regarding claim 31, see the analyses of claims 7 & 23.

Regarding claim 32, see the analyses of claims 8 & 24.

Regarding claim 33, see the analyses of claims 11 & 27.

Regarding claim 34, see the analyses of claims 10 & 26.

Regarding claim 35, see the analyses of claims 12 & 28.

Regarding claim 36, see the analysis of claim 1. It is noted that the image data stored in the memory or buffer must be transmitted to the second software-exclusive module in order for the histogram processing to function as disclosed.

Regarding claim 37, see the analyses of claims 1 & 3.

Regarding claim 38, see the analyses of claims 1 & 3.

Regarding claim 39, see the analysis of claim 36.

Regarding claim 40, it is clear in the combination of Chu, Lewis and Danielson that the multitasking operating system is controlled by the processor within the imaging device that executes all of the imaging device multitasking applications. See Danielson col. 2, lines 3-10.

Regarding claims 41-47, see the analyses of claims 7-12, respectively.

Regarding claims 49 & 50, see the analyses of claims 1 & 3, wherein the imaging device is a barcode imaging device (Chu, col. 1, lines 16-25). Furthermore, Chu also discloses that the decoding circuitry 92 is separately embodied in code (a second software-exclusive module in this claim) operable by the microprocessor (Chu, col. 14, lines 20-24), and a third software-exclusive

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module performs calculations on the image data (i.e., histogram processing to determine targeted exposure and gain settings).

Regarding claim 51 & 52, see the analysis of claim 1, wherein the first software-exclusive module controls exposure time of the imager and must be synchronized with the timing of the imager for the imaging device to function properly as disclosed.

Regarding claim 53, it is clear that the barcode imaging device is defined as a portable barcode imaging device. See Chu, Figs. 10-13.

4. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al and Lewis as applied to claim 1 and in further view of Feng (Us 6,062,475).

Regarding claim 14, Chu and Lewis do not specifically teach a Direct Memory Access (DMA) controller that receives the image signals from the imager, responds to an image capture command from the second software-exclusive module and transfers captured image signals into the memory component. As taught by Feng, DMA controller (275) is utilized to transfer captured image signals into memory (274) in response synchronized and clock signals for capturing an image. See Feng, Figs. 29A & B; col. 21, lines 23-30.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify imaging device in Chu and Lewis to include DMA controller taught by Feng for transferring the image signals directly into the memory in response to image

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capture command without going through the microprocessor so that workload on the microprocessor is reduced, thereby faster processing is realized.

Regarding claim 15, it is clear that the processor comprises the DMA controller in the combination of Chu, Lewis and Feng.

Regarding claim 16, as shown in Fig. 29A in Feng, DMA controller is inherently a programmable logic device that serves as an interface between the imager and the processor.

Regarding claim 17, see the analyses of claims 14 & 16.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-7371. The examiner can normally be reached on Monday - Thursday, 8:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Groody can be reached on (571) 272-7950. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NT.


TUAN HO
PRIMARY EXAMINER